

PSYCHE.

SYNOPSIS OF THE ODONATA OF NORTH AMERICA, NO. 2. THE GENUS ANAX.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

I. ANAX LONGIPES.

Anax longipes, female, Hagen Synop. Neur. N. A., 1861, 118, 2; Stett. ent. zeitung, 1863, v. 24, 373, 52; Verhandl. Wien zool.-bot. ges., 1867, v. 17, 35; Proc. Bost. soc. nat. hist., 1874, v. 16, 350, 2; Synop. Odon. N. A., 1875, 32, 2.—Brauer Reise österr. freg. Novara, 1866, bd. 2, 60, 3.—Male, M'Lachlan Ent. mo. mag., 1874, v. 10, 227; 1883, v. 20, 129, 171.—Hagen, *op. cit.*, 1883, v. 20, 169.

Male (living), eyes dark reddish brown; head, thorax, base of abdomen green; abdomen beautiful brick red; front green; without any spot above; vertex, antennae, occiput black; eyes behind with a very large elongated green spot; thorax beautiful green; legs black, femora yellow, the articulation with the tibiae and the inside of the anterior femora black; posterior tibia 12 mm.; posterior femur 16 mm.; hind legs reaching beyond the fourth segment; abdomen with the two basal segments inflated, green; first segment with two brown spots on the basal thoracical impression; second segment with a transversal dark median stripe,

a darker anteapical spot and two round apical reddish green spots; the transversal median stripe is interrupted in the middle by a granulose somewhat triangular plate; the following segments of a beautiful brick-red, segments 3 to 5 with a brown triangular apical spot, less marked in 6, and a triangular basal brown spot on 4 and 5; all of these spots disappear in the dead insect, and the color of the abdomen becomes an indifferent reddish brown; last segment above with a narrow impressed rim at the middle of the base; appendages brick-red; the superiors as long as the two last segments, straight, narrow, cylindrical at base; along the external margin with an elevated keel ending in a short spine on the apex; a large basal excision internally; the inner margin of the following part is also slightly excised; inferior appendage very short, narrowed to tip, with two apical black tubercles above; on each side of the second segment below there is a small pointed spine on the basal plate near the margin of the genitals.

Wings hyaline, venation black, costa yellow, pterostigma narrow, yellow;

membranula black, white at base; antecubitals 17—19, postcubitals 8—10.

A male from Haulover, Fla., 3 March, though of a slightly smaller size, is not different. One from Haiti also of a similar size differs by the unfinished color of the occiput (it is somewhat livid) and by the presence of a yellowish tinge in the middle of the hind wings. Three males from Mexico are a very little smaller, but do not differ except that the femora are very dark brownish red, the pterostigma a little darker and there is a yellow tinge in the middle of the hind wings.

Female (living), head, thorax, legs and the two basal segments of the abdomen as in the male; eyes blue, the hind margin of the occiput on each side yellow; second segment with a transversal brownish median stripe on each side; a darker anteapical spot, and two apical blue ones; abdomen from the third segment brown, segments 3—9 with two apical blue spots, segments 3—7 with two basal blue spots, and segments 4—6 with two intermediate blue spots; appendages light brown, as long as the two last segments, lanceolate with an elevated keel to the tip, which is not sharply pointed; wings as in the male; 19 antecubitals, 9 postcubitals.

Two females from Florida are a little smaller, the color and pattern are similar, the last segment is light brown. Race CONCOLOR.

Anax concolor Brauer Reise österr. freg. Novara, 1866, bd. 2, 66, pl. 1, f. 15, app. ♂.—Hagen Synop. Odon. N.

A., 1875, 38, 2.

Male, though a little smaller it is entirely similar to *A. longipes*, except the color of the abdomen, which for segments 3-10 is not red but dark brownish-black with the pattern of large spots just as in the female; color of these spots yellowish; the two basal segments in color and sculpture as in *A. longipes*; appendages red, occiput more livid; wings as in *A. longipes*; antecubitals 15-19; postcubitals 8-9; the abdomen also is similar to that of the described living female; the blue spots are retained perfectly in the dead specimen.

	Longipes ♂				Concolor ♂
	Mass.	Fla.	Haiti.	Mexico.	Brazil.
Length.	85	79	74	72	70-74
Abdomen.	58	55	53	50	50-53
Appendages.	6	6	6	6	6
Exp. wings.	110	102	102	100	92-95
Hind wing.	53	51	51	48	44-48
Pterostigma.	6	6	5	5	5
	Longipes ♀		Concolor ♀		
	Mass.	Fla.	Brazil.		
Length.	86	76-73	76		
Abdomen.	60	56-52	54		
Appendages.	6	6-5	5		
Exp. wings.	114	103-99	100		
Hind wing.	56	51-49	48		
Pterostigma.	6	6-5	5-4½		

HAB. Georgia, Abbot, a male in the Museum of science and art, Dublin; a female (my type) in the collection of Escher Zollikofer, now in the University museum in Zurich, Switzerland; two males and one female collected by myself, 25 August, 1875, at Woods Holl, Mass.; a female (not seen by me) collected by Mr. P. R. Uhler, in 1875 near Baltimore, Md.; a female collected by Mr. R. Thaxter in 1875 in Florida, and

a pair collected by Mr. H. G. Hubbard 3 March, at Haulover, Florida; two males Jalapa, Mexico and one male Amula, Guerrero, Mexico, 6000 ft. August, Mr. H. H. Smith; one male collected by Mr. W. Cabot, 14 February, 1884 in Haiti; var. *concolor* three males, one female collected by Mr. H. H. Smith at Matto Grosso, Brazil; one male, type of Brauer (not seen by me), near Rio Negro, Brazil. I am glad to record 19 specimens of this species, which has been considered very rare. When I described *A. longipes* only the female was known, and when Mr. Brauer described *A. concolor* but one male was in his hands. The number of males now before me makes it certain that *A. concolor* is only a southern race of *A. longipes*, having the pattern of the abdominal spots of the female also preserved in the male. I confess that a similar race of an *Anax* or of an *Aeschna* is unknown to me, but the exact identity of all other characters agrees well with my opinion. The splendid brick-red color of the living male may perhaps be variable, as I have seen but two males alive. It is remarkable that both the male caught by myself and the female caught by Mr. Thaxter had captured a *Papilio asterias*, had cut off the head of the same and were ready to devour their prey when caught themselves.

Mr. W. Cabot also brought from Haiti some nympha skins which probably belong to *A. longipes*. They are of the size of *A. junius* but are red. I am not able to make out any specific

difference.

Mr. L. Cabot, Mem. mus. comp. zool. v. 8, p. 17, has described the supposed nympha of *A. amazili*, from Jamaica; he now believes this to be identical with the nympha from Haiti, supposed to belong to *A. longipes*.

2. ANAX JUNIUS.

Libellula junia Drury Ill., 1770, v. 1, 112 pl. 47, f. 5.

Aeschna junia Burm. Handb., 1839, v. 2, 841, 18.—Say Journ. Acad. nat. sci. Phil., 1839, v. 8, 10, 2.—Ramb. Nevv., 1842, 196, 6.

Anax junius Sclys Rev. Odon., 1850, 328.—Sagra Ins. Cuba, 1856, 458.—Hagen Synop. Neur. N. A., 1861, 118, 1; Stett. ent. zeitung, 1856, v. 17, 369; 1860, v. 21, 213; 1863, v. 24, 373, 51; Verhandl. Wien zool.-bot. ges., 1867, v. 17, 33; Proc. Bost. soc. nat. hist., 1868, v. 11, 291; 1873, v. 15, 271, 28; 1874, v. 16, 350, 1; Synop. Odon. N. A., 1875, 32, 1.—Brauer Reise österr. freg. Novara, 1866, bd. 2, 61, 10.—Walsh Proc. acad. nat. sci. Phil., 1862, 397.—Cabot Mem. mus. comp. zool., 1881, v. 8, 15, 4, pl. 1, f. 2.

Anax spiniiferus Ramb. Nevv., 1842, 186, 4, pl. 1, f. 14.

Head and thorax grass green, abdomen ultramarine blue (male), obscure pale purple or lilac (in the living female)¹; front above with a round black spot with a circular dark blue band around; feet black, femora rufous; first segment and the base of the second

¹These colors of the living insect were given to me by the late Benj. D. Walsh.

green, with the transverse elevated rim not interrupted, but united with the opposite one at a right angle; a dorsal fuscous fascia, interrupted and partly angulose on the abdomen after the basal segments; male appendages dark fuscous, straight, enlarged towards the apex, with an internal excision on the tip and a sharp external apical spine; inferior very short, quadrangular, transverse; those of the female lanceolate; wings hyaline, flavescent or not in the middle; costa yellow, also the narrow pterostigma; membranula black, white at base; antecubitals 16—19, postcubitals 7—9.

Length.	68-78
Exp. wings,	104-116
Pterostigma.	7

HAB. St. John, New Brunswick, August; Canada, St. Hyacinth, Quebec, Provancher; Hamilton, Ontario, end of August, Moffat. United States: Mass., Magnolia, Milton, Brookline.—N. Y., N. J., Pa., Philadelphia.—Md., Kent., S. C., Geo., Fla., Mo., La., Tex., Ill., Mich., Minn., Dak., Nev., Cal., Or. The Dalles, June.—N. Mex., Ariz., Alaska, Sitka.

Mexico: Matamoras, Jalapa, Amula 6000 ft.—Costa Rica.

Antilles: Cuba, Poly; Martinique.

China: Petcheli Bay, April. Osten Sacken; Kamtschatka.

Sandwich Islands: Oahu, Honolulu, Taiti (Selys).

I have described as *A. strenuus* a female, now in the Copenhagen museum, from Oahu, collected during the circumnavigation of the GALATHEA.

The only difference from *A. junius* consists in the shape of the occiput (the lateral lobes being longer, more elevated and quadrangular) and in the gigantic size. Length, 94 mm., exp. of wings, 136 mm. The specimens of *A. junius* from Oahu are all very large, but the size of this giant is entirely unusual. I have before me a number from Oahu but none of them similar in size.

3. ANAX WALSLINGHAMI.

Anax walsinghami M'Lachlan Ent. mo. mag., 1883, v. 20, 127, 171.

Anax validus Hagen Synop. Odon. N. A., 1873, 32 (no description); Cabot Mem. mus. comp. zool., 1881, v. 8, 15.

Head yellow, front with a round black spot in a blue ring, anteriorly bordered with a fine black line; vesicle black, transversely yellowish above; antennae black, seta brownish; occiput yellow, emarginate; head behind yellow, with a superior narrow blackish margin; thorax green; feet black, femora reddish brown, the anterior yellow beneath; length of the posterior femora about 14 mm; abdomen very long (male), especially segments 5—6, shorter in the female; blue at base. suture of second segment interrupted at the middle, a dorsal blackish band, beginning on the fifth segment and finishing on the ninth with an apical elongate blue spot on each side, and a basal whitish one on segments 8 and 9; the last segment as broad as long (male) blue, margin black and irregularly black on the dorsal line; superior appendages of the male, short, broad, brown, flattened and foliaceous, upturned on the

apex; in front of the appendages a deep excision forms a strong, long tooth; inferior appendage one half shorter, slightly longer than broad, shallowly excised on the tip. Appendages of female short, oval. Wings large, hyaline, neuration black, costa yellow, pterostigma short, brown; membranula black, white at base; antecubitals 19—16; postcubitals 10—8.

	Male.	Female.
Length,	105	95
Abdomen,	85	77
Exp. hind wing,	125	120

HAБ. California, San Diego.

This species was discovered by the late G. R. Crotch in 1872. He gave two splendid couples to the Museum of comp. zool. Later several specimens were collected in northern California by Lord Walsingham; the collection of the Museum has two males from Tucson, Arizona. An incomplete male (not seen by me) from Guatemala is in McLachlan's collection. Mr. L. Cabot in "The immature state of the odonata. Part 2. subfamily *Aeschnini*" 1881, p. 15, mentions some nymphæ from San Diego, California, more bulky than *A. junius* and with two black teeth in the middle of the comb of the front border of the mask and another large nymphæ from New Mexico. It was believed rather doubtful that nymphæ so similar to those of *A. junius* should belong to the gigantic and very different *A. validus* (= *walsinghami*). After a new and detailed study of this subject I think these nymphæ may belong to *A. walsinghami*.

4. ANAX AMAZILI.

Aeschna amazili Burm. Handb., 1839, v. 2, 841, 19.

Anax maculatus Ramb. Nevr., 1842, 188, 7.

Anax amazili Hagen Synop. Neur. N. A., 1861, 119, 3; Verhandl. Wien zool.-bot. ges., 1867, v. 17, 38; Synop. Odon. N. A., 1875, 32, 4; 38., 1.—Brauer Reise österr. fieg. Novara, 1866, bd. 2, 61, 9.

The color of this species is black and and green but the green is not so beautiful as in *Lepthemis vesiculosa* Fabr. This note is by Mr. Veilenmann and made from specimens collected by him in Pernambuco, Brazil. My description in the Synopsis is made from Professor Burmeister's types.

HAБ. Guatemala; Cuba; Barbados; Porto Cabello, Venezuela; Amazon, Para, Pernambuco, Rio, Brazil.

There are on the whole continent of America only four species of *Anax* known. The gigantic size and brilliancy of their colors makes it rather improbable that any new species will be found, but of course it is not impossible. Of the four species *A. junius* is strictly North American, passing down a short distance to the Isthmus and the Antilles. This species is apparently introduced into the Sandwich Islands, where its size is larger, and in the north in China and Kamtschatka.

A. longipes is a South American species, passing along through the Antilles and Florida and, favored by the Gulf stream, to southern Massachusetts.

A. walsinghami is a North American

species, found west of the Rocky Mountains, extending south to Guatemala.

A. amazili is strictly a South American species extending to the north to

the Antilles and Central America.

There are two species in Australia, three in Europe, four in Africa and perhaps ten in Asia.

THE ARGYNNIDES OF NORTH AMERICA.

BY HENRY JOHN ELWES, CIRENCESTER, ENGLAND.

[Reprint, p. 563-575, from "A revision of the genus *Argynnis*," (Trans. ent. soc. London for the year 1889. p. 535-575.)]

The Argynnidæ of North America are, without exception, the most difficult butterflies to classify that I have ever studied. I have a collection which includes authentically named specimens of almost all the species and varieties, many of them direct from such well-known collectors as Messrs. H. Edwards and Morrison; many from Messrs. Strecker and Geddes. I have also seen some of the best collections in the United States, and studied all, or almost all, the large mass of scattered literature and notes on the genus by Messrs. W. H. and H. Edwards, Mead, Geddes, Scudder, and Strecker. I have repeatedly tried to construct a key by which the supposed species could be identified, and can only say that I have completely failed. I am certain that no entomologist, who received to-day the most perfect collection which could be got together from all parts of North America, and had to classify and describe them without regard to the works of others, would

make anything like as many species as have been recognized. It seems presumptuous for a man to set aside much of what has been written by those who have seen, both living and dead, so many more specimens than I have seen, and yet I cannot, in dealing with the American forms, adopt as specific characters so slight and variable that they would not be recognized as such in the much better known European species. And to show that it is not my ignorance alone which makes the difficulty, I may say that it is just those species which I have personally observed in life, and which I have most carefully examined, such as *A. eurynome*, *A. liliana*, *A. monticola*, and *A. meadii*, in which I have found my uncertainty the greatest. Mr. Strecker's remarks, on p. 118 of his Catalogue, are so much to the point that I will quote them here, and can only say if our American colleagues do not agree with them, let them rather point out how others may under-